



## Original Article

# Functional evaluation of repairs to circumferential labral lesions of the glenoid – Case series<sup>☆</sup>



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## ABSTRACT

**Objective:** To evaluate the clinical results among patients undergoing arthroscopic repair of circumferential labral lesions.

**Methods:** This was a retrospective study on 10 patients who underwent arthroscopic repair to circumferential labral lesions of the shoulder, between September 2012 and September 2015. The patients were evaluated by means of the Carter-Rowe score, DASH score, UCLA score, visual analog scale (VAS) for pain and Short-Form 36 (SF36). The average age at surgery was 29.6 years. The mean follow-up was 27.44 months (range: 12–41.3).

**Results:** The mean score was 16 points for DASH; 32 points for UCLA, among which six patients (60%) had excellent results, three (30%) good and one (10%) poor; 1.8 points for VAS, among which nine patients (90%) had minor pain and one (10%) moderate pain; 79.47 for SF-36; and 92.5 for Carter-Rowe, among which nine patients (90%) had excellent results and one (10%) good. Joint degeneration was present in one case (10%), of grade 1. We did not observe any significant complications, except for grade 1 glenohumeral arthrosis, which one patient developed after the operation.

**Conclusion:** Arthroscopic repair of circumferential labral lesions of the shoulder through use of absorbable anchors is effective, with improvements in all scores applied, and it presents low complication rates. Cases associated with glenohumeral dislocation have lower long-term residual pain.

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## Avaliação funcional do reparo de lesões labrais circunferenciais da glenoide – Série de casos

## RESUMO

**Objetivo:** Avaliar os resultados clínicos dos pacientes submetidos a reparo artroscópico de lesão labral circunferencial.

**Métodos:** Estudo retrospectivo de 10 pacientes submetidos ao reparo artroscópico de lesão labral circunferencial do ombro de setembro de 2012 a setembro de 2015. Os pacientes

## Palavras-chave:

Cápsula articular

Instabilidade articular

Articulação do ombro

<sup>☆</sup> Work conducted at the Hospital Orthoservice, Grupo de Ombro e Cotovelo, São José dos Campos, SP, Brazil.

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Artroscopia  
Estudos retrospectivos

foram avaliados pelo escore de Carter-Rowe, pelo escore de Dash, pelo escore de UCLA, pela classificação visual analógica de dor (EVA) e pelo Short-Form 36 (SF36). A média de idade na cirurgia foi de 29,6 anos. O seguimento médio foi de 27,44 (variação de 12-41,3) meses.

**Resultados:** A média dos escores foi de 16 pontos no Dash; 32 pontos no UCLA, seis (60%) resultados excelentes, três (30%) bons e um ruim (10%); 1,8 ponto na EVA, nove (90%) dores leves e um (10%) dores moderadas; SF-36 de 79,47; e na escala de Rowe 92,5 pontos, nove (90%) resultados excelentes e um (10%) bom. Degeneração articular esteve presente em um (10%) caso, de grau 1. Não observamos complicações significativas, a não ser a artrose glenoumeral grau 1, desenvolvida no pós-operatório de um paciente.

**Conclusão:** O reparo artroscópico da lesão labral circunferencial do ombro com o uso de âncoras absorvíveis é eficaz, com melhoria de todos escores aplicados, e apresenta baixos índices de complicação. Os casos associados a luxação glenoumeral apresentam menor dor residual em longo prazo.

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## Introduction

Labral lesions and glenohumeral instability are common injuries in populations of athletes and blue-collar workers. Anterior labral lesions (Bankart) were first described by Perthes<sup>1</sup> and Bankart.<sup>2</sup> Superior labral lesions were first described by Andrews et al.<sup>3</sup> in a population of throwing athletes. Snyder et al.<sup>4</sup> later classified SLAP lesions into four categories; 5% out of 2375 lesions were ranked as complex, i.e., those lesions could not be classified as the types/associated types described. The association between Bankart lesions and SLAP lesions is well known; arthroscopic repair has been associated with good results,<sup>5-8</sup> but the treatment of other combinations of labral lesions has rarely been described.

With the advancement of arthroscopy, the combination of labral lesions that appear as a circumferential detachment of the entire glenoid labrum has been acknowledged. Powell et al.<sup>9</sup> classified this injury as a pan-labral SLAP lesion or type IX. Lo and Burkhart described triple labral lesions (anterior, posterior, and SLAP type II) in a retrospective review of seven patients. Two of the seven patients had circumferential detachment of the labrum. All these injuries were repaired arthroscopically with fixation anchors, with no cases of instability recurrence.<sup>10</sup>

This study aimed to report a series of ten patients, presenting scores to evaluate the functional outcome of treatment of circumferential labral lesions.

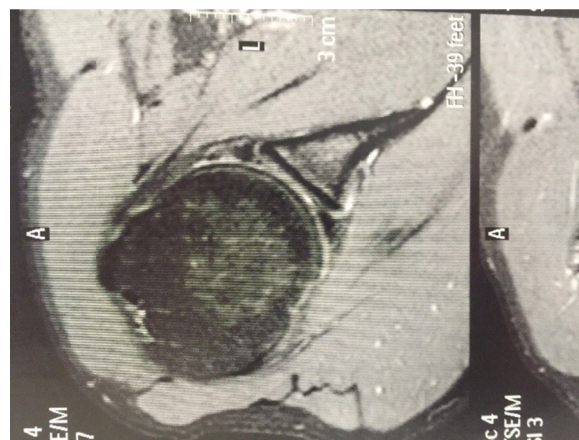
## Material and methods

Between September 2012 and September 2015, ten patients underwent arthroscopic treatment of circumferential labral lesions and were operated in the Orthoservice Hospital in São José dos Campos (SP) by a single surgeon. The distribution according to age and activity with probable association with the disease is shown in Table 1. All patients were male. The study included patients with one or more episodes of anterior shoulder dislocation or symptoms and examination compatible with hidden instability or higher labral lesion

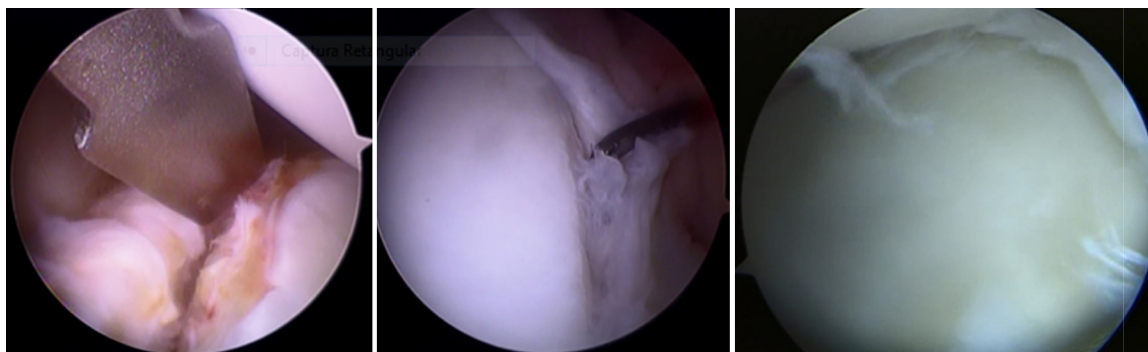
**Table 1 – Patients' clinical data.**

Patient	Age	Activity
1	52	Blue-collar worker
2	26	Athlete
3	41	Blue-collar worker
4	29	Athlete
5	18	Athlete
6	31	Athlete
7	32	Blue-collar worker
8	20	Athlete
9	18	Athlete
10	35	Blue-collar worker
Mean	30.2	

after magnetic resonance imaging (MRI, Fig. 1). The minimum follow-up was defined as one year. Exclusion criteria in the selection of patients comprised cases of traumatic dislocation associated with nerve and vascular injuries, trauma cases related to fractures at other sites of the shoulder girdle, Hill-Sachs lesion involving more than 25% of humeral head, and Bankart lesion involving more than 25% of the glenoid.



**Fig. 1 – Magnetic resonance image showing anterior and posterior labral injury.**



**Fig. 2 – Circumferential labral lesion.**

### *Preoperative period*

Preoperatively, all patients underwent clinical evaluation for the diagnosis and classification of shoulder instability, function, and pain, using the Rowe, DASH, UCLA, VAS, and SF-36 scores. Patients underwent preoperative MRI, but the labral lesion was detected preoperatively in only three of the ten cases. In the other cases, indication for surgery was to repair just one labral segment, but a circumferential labral lesion was evidenced intraoperatively.

### *Surgical technique*

The surgical procedure was done with the patient under general anesthesia and brachial plexus blockade, positioned in the lateral decubitus position opposite to the injured shoulder.

On the surgical table, vertical and longitudinal traction were applied; limb was maintained at about 60 degrees of abduction and 15 degrees of flexion through fixed longitudinal and vertical traction, using 5 kg weights.

The anterior, anterolateral, and posterior portals were used in the repair; the arthroscope was positioned in the anterolateral portal. For all cases, complete inspection of the joint was made to evaluate associated lesions and to confirm that the lesion was indeed circumferential (Fig. 2). After proper preparation of the glenoid, the lesions were repaired primarily in the posterior region with three anchors. Then, the upper region was repaired with one anchor and the anterior with three anchors; a total of seven anchors (all absorbable) were used

to achieve a complete repair of the lesion (Fig. 3). When a rotator cuff was associated, it was properly repaired to heal all injuries (one case).

### *Postoperative period*

Patients remained under continuous immobilization in a sling for four weeks, after which the rehabilitation process started. Physical therapy was initially indicated only for range of motion gain; only when this was completed was the muscle-strengthening phase initiated.

### *Clinical evaluation*

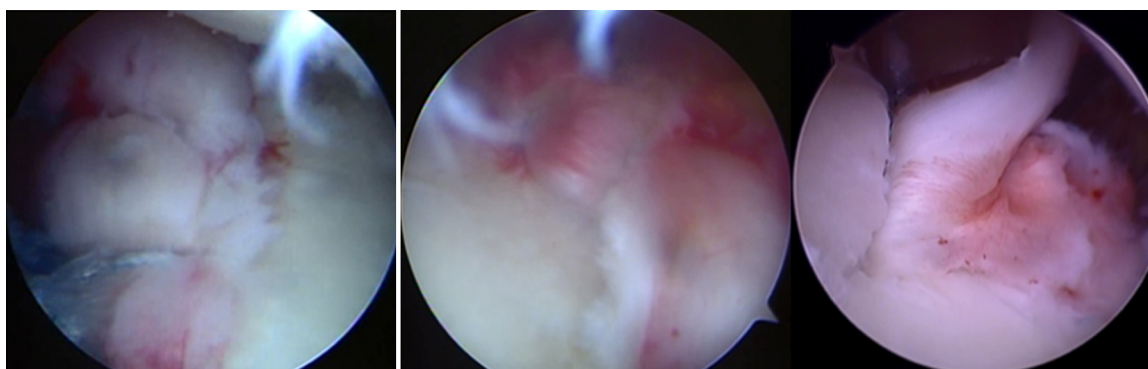
All study patients had a minimum postoperative follow-up of 12 months. All patients were male; nine right shoulders and one left shoulder were operated.

Questionnaires were applied to patients in the routine pre-operative assessment and postoperatively at three and six months, and at one year, two years, and three years in cases with complete follow-up.

Operative results were quantified through the Carter-Rowe,<sup>11</sup> DASH, UCLA, VAS, and SF-36 scores.

## **Results**

In the clinical evaluation with the DASH, UCLA, VAS, and Carter-Rowe scores, a mean postoperative score of 16 points was observed for the DASH score; 32 points for the UCLA score



**Fig. 3 – Repair of the circumferential labral lesion.**

**Table 2 – Comparison of pre- and post-operative results.<sup>a</sup>**

	UCLA	DashH	Rowe	VAS
Pre-op	22.3 ± 3.8 (16-27)	40.2 ± 25 (10.83-75.83)	43.5 ± 22.5 (5-75)	6.8 ± 2.6 (3-10)
Post-op	32 ± 4.9 (19-35)	16 ± 23 (0.83-75.5)	92.5 ± 7.9 (75-100)	1.8 ± 2.15 (0-7)
p-Value	<0.000001	<0.009	<0.0001	<0.0001

<sup>a</sup> Values are presented as mean and standard deviation; the range is shown in parentheses.

**Table 3 – SF-36 – comparison of the pre- and postoperative periods.<sup>a</sup>**

SF-36	Functional outcome	Limited due to physical aspects	Pain	General health status	Vitality	Social aspects	Limitations due to emotional aspects	Mental health
Pre-op	78 ± 14.75 (55-100)	35 ± 41.16 (0-100)	47.1 ± 17.1 (20-72)	78.1 ± 16.5 (55-97)	66 ± 22.5 (25-100)	73.7 ± 23.9 (37.5-100)	60 ± 46.6 (0-100)	74.2 ± 17.8 (48-96)
Post-op	88 ± 16.9 (55-100)	80 ± 42.1 (0-100)	75.1 ± 14.6 (41-90)	75.8 ± 14.7 (57-97)	75 ± 18.5 (40-90)	87.5 ± 14.4 (62.5-100)	80 ± 42.1 (0-100)	77.4 ± 13.6 (48-92)
p-Value	<0.044	<0.0187	<0.0032	0.316	0.3434	0.091	0.313	0.519

<sup>a</sup> Values are presented as mean and standard deviation; the range is shown in parentheses.

**Table 4 – Comparison of results between the group of athletes (with episodes of dislocation) with the group of blue-collar workers (with episodes of dislocation).<sup>a</sup>**

	UCLA	DashH	Rowe	VAS
Athletes	34.16 ± 0.7 (33-35)	4.44 ± 3.5 (0.83-10.83)	95 ± 5.4 (90-100)	0.5 ± 0.5 (0-1)
Blue-collar workers	28.75 ± 6.8 (19-34)	31.14 ± 32.8 (7.5-77.5)	88.75 ± 10.3 (75-100)	3.7 ± 2.2 (2-7)
	0.211	0.201	0.326217	0.058

<sup>a</sup> Values are presented as mean and standard deviation; the range is shown in parentheses.

**Table 5 – Comparison of SF-36 results between the group of athletes (with episodes of dislocation) with the group of blue-collar workers (with episodes of dislocation).<sup>a</sup>**

	Functional outcome	Limited due to physical aspects	Pain	General health status	Vitality	Social aspects	Limitations due to emotional aspects	Mental health
Athletes	96.7 ± 4.08 (90-100)	100 ± 0 (100)	83.3 ± 5.16 (74-90)	85 ± 11.3 (67-97)	80 ± 10.4 (60-90)	95.83 ± 10.2 (75-100)	100 ± 0 (100)	85.6 ± 4.45 (80-92)
Blue-collar workers	75 ± 19.5 (55-100)	50 ± 57.7 (0-100)	62.75 ± 15.5 (41-74)	62 ± 4.08 (57-67)	60 ± 23.09 (40-80)	75 ± 10.2 (62.5-87.5)	50 ± 57.7 (0-100)	65 ± 13.6 (48-76)
p-Value	0.056	0.09	0.03	0.001	0.09	0.008	0.09	0.02

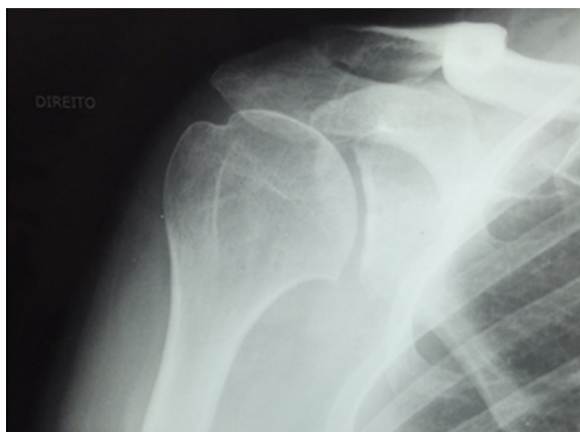
<sup>a</sup> Values are presented as mean and standard deviation; the range is shown in parentheses.

(six [60%] excellent results, three [30%] good, and one poor [10%]); 1.8 points in the VAS (nine [90%] cases of mild pain and one [10%] case of moderate pain); and 92.5 in the Carter-Rowe score (nine [90%] excellent results, one [10%] good). Overall SF-36 score was 79.85. Table 2 presents the comparison between the pre- and post-operative results, analyzed with Student's t-test, and Table 3 presents the SF-36 results, stratified into its eight areas and analyzed with the t-test. None of the patients had a new episode of glenohumeral dislocation. One patient had poor outcome associated with the development of glenohumeral arthrosis. Comparing the final result through Student's t-test, the results were analyzed separately based on the primary pathology, i.e., the cases of frank instability (athletes) were compared with cases in which, despite the

signs on physical examination, the patient had no history of glenohumeral dislocation (blue-collar workers). Results are described in Tables 4 and 5. Seven absorbable anchors were used for labral repair, with three anchors to repair the posterior labrum, one for superior labrum repair, and three for anterior labrum. The repair sequence was always posterior to anterior; the superior labrum was repaired between these two. To repair the posterior labrum, a smaller diameter cannula was used in all cases, and it was always used despite the small posterior space.

Tables 2 and 3 show the statistically significant results,  $p < 0.05$ , for all functional and pain scores (Table 2), and all functional and pain aspects of the SF-36 (the first three columns of Table 4). The aspects of the SF-36 that showed





**Fig. 4 – Glenohumeral arthritis, Samilson grade 1.**

no statistically significant differences were those relating to quality of life and emotional aspects.

Tables 4 and 5 present non-statistically significant results,  $p > 0.05$ , for the main functional differences and pain scores (Table 4); regarding SF-36 (Table 5), of the questions that assess function and pain, only the question on pain had significant difference between the groups. There was a significant difference for results of quality of life and mental health.

One patient had subscapularis and supraspinatus injury associated with the labral lesion. In this case, in addition to the repair of the labral injury, the aforementioned tendons were also repaired. Patient presented an equally good outcome, with the following results: DASH, 8.33; UCLA, 34; Rowe, 90; VAS, 2; and SF-36, 82.4. When assessing the cases separately, it was observed that one patient had a bad outcome, with low scores (DASH, 77.5; UCLA, 19; Rowe, 75; VAS, 7; and SF-36, 47.24), which were associated with the development of glenohumeral arthrosis postoperatively (Fig. 3). One of the patients is a professional rugby athlete and was able to return to the same level of performance without symptoms. The other athletes were amateurs and were all able to return to the same level of activity prior to the injury. Of the four blue-collar workers, one is retired, one was able to return to activities, and two are in adapted work, having failed to return to the previous activity (Fig. 4).

## Discussion

Little has been written about circumferential labrum glenoid injuries.<sup>4,7,8,12,13</sup> Powell et al.<sup>9</sup> first described a circumferential labral lesion as a SLAP injury type IX. In a retrospective study, Lo and Burkhart<sup>10</sup> described patients with anterior Bankart, posterior Bankart, and type II SLAP associated lesions. Two of the injuries were circumferential. The authors noted that these lesions represented 2.4% of all labral lesions and believed that the injury began with a traumatic event, with anterior dislocation in abduction and external rotation. Posterior instability and pan-labral lesions would be an extension of anterior instability.<sup>4,8,14</sup> Similarly, in the present series, six shoulders had a history of anterior instability. However, in cases where there was no history of instability, patients

reported working for hours with equipment that generated vibration and thus microtrauma, with the arm in abduction and external rotation position. Circumferential labral lesions tend to be more symptomatic, even in the absence of a recent episode of dislocation. As circumferential labral lesions are difficult to diagnose based solely on history and physical examination, the orthopedist should have a high suspicion when examining a shoulder with several episodes of dislocation, substantial pain in the absence of a recent episode, and provocative maneuvers that reproduce symptoms both in the anterior, posterior and superior regions. In such situations, a magnetic resonance arthrography may aid an accurate diagnosis, since in the present study, even though a 1.5 T MRI was used, labral lesions were only diagnosed as circumferential in three of the ten cases. The present surgical approach followed the technique published by Tokish et al.,<sup>15</sup> except for the fact that it began by posterior repair rather than SLAP repair, as described earlier. The reasoning for repairing all parts of the pan-labral lesion is based on the fact that even if the instability is anterior, for example, damage to other portions of the labrum may contribute to instability, pain, and poor healing of the repaired labral region.<sup>10,15</sup> Neer et al.<sup>16</sup> described the association of surgical treatment of shoulder dislocation with the degeneration of that joint. In 1983, Samilson and Prieto<sup>17</sup> coined the term “instability arthropathy” and radiographically classified that entity.

The results of the present study, after a mean of 2.5 years of follow-up, were very good. All patients showed significant improvement in all evaluated scores in relationship to pain, function, and sensation of instability, except for one patient who observed a small improvement. A statistically significant improvement was observed in all scores. Improvement was more pronounced in cases related to instability (athletes) than in cases in which there was no frank instability (blue-collar workers); nonetheless, despite this trend of better results in that group, the difference in most of the scores was not statistically significant. The failure rate in the present study was 10% (with one case that evolved to glenohumeral arthrosis, albeit incipient). Authors believe that, in this case, the joint degeneration has occurred due to the surgical treatment, as this patient did not have frank instability. It is likely that there is still some influence from work activity on the results presented by the blue-collar workers; the only result that was similar to athletes in all scores was that of the retired patient, despite his age.

The authors also emphasize that circumferential labral lesions are difficult to diagnose at physical examination; signs of anterior instability or SLAP injury are more evident. MRI without contrast was not very helpful for the identification of these lesions. Due to the difficulty of preoperative diagnosis, the surgeon may be surprised by this injury during the procedure; the patient may be positioned in a non-ideal position for complete repair or an adequate number of anchors may not be available for complete repair of the lesion.

## Conclusion

Surgical treatment of circumferential labral injuries presented excellent and good results in scores evaluated. Instability

cases had a tendency toward better results than those who had no history of instability, although it was not statistically significant in most of the scores. Out of ten cases, only one did not present a satisfactory result, which may be related to post-surgical glenohumeral arthrosis or secondary working gains.

### Conflicts of interest

The authors declare no conflicts of interest.

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